ANACONDA Copper Company
New Mexico Operations
P.O. Box 638
Grants, New Mexico 87020
505/876-2211

March 21, 1981

Mr. Ed Sandell,
Area Mining Supervisor
U.S. Geological Survey
P.O. Box 26124
Albuquerque, New Mexico 87125

Dear Mr. Sandell:

Enclosed are two copies of the Annual Reclamation Report on mining activities of the Anaconda Copper Company, New Mexico Operations on the Laguna Pueblo for the calendar year 1980. This report is required by 25CFR 177.9.

Many of the points regarding remaining reclamation and associated topics are contained in the Reclamation Plan submitted on 11, September 1980, pending activities and approval by USGS. This report describes those activities which transpired during calendar year 1980.

I appreciate your patience regarding these reports, as we have committed our manpower to preparation of the answers to your questions on the Reclamation Plan.

If you have any questions on this submittal, please call me.

Sincerely,

Meade A. Stirland, Manager
ENVIRONMENT, HEALTH & SAFETY

jls

Enclosures

Maps for this report with mine maps in flat file

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

INTRODUCTION - SURFACE ACTIVITY

The following summary describes the surface activity conducted for the year January 1 to December 31, 1980 at the Jackpile-Paguate Open Pit Mine. This report is to fulfill the requirements set by the Bureau of Indian Affairs and the U.S. Geological Survey to describe all surface activity and the consequent effects of operations.

Enclosed Maps:

A. Sheet 1 - Mining, Stripping and Stockpiling Activity - 1980.
B. Sheet 2 - Waste Dumps, Backfill, Topsoil Stockpiles and Inactive Stockpiles - 1980.
C. Jackpile-Paguate Mine Surface Conditions as of December 31, 1980.

All maps 1" = 400'

DEFINITION OF TERMS

1. STRIPPING - Overburden removal to within $^{+}$ 30 ft. of "Jackpile" Sandstone.

2. MINING WASTE - Accounting definition of waste material above "Jackpile" Sandstone. This waste material does not contain any radioactive sandstone, and/or ore associated in the Jackpile Sandstone that is less than 0.02% U_3O_8.

3. PROTORE - Ore associated Lo-Grade material that ranges from .02 - .039% U_3O_8; Stockpiled separately.

4. ORE - Jackpile Sandstone that is .04+% U_3O_8.

5. WASTE DUMP AREA - Stripping and mining waste (a) Disposal site that is outside existing pit confines.

6. BACKFILL AREA - Stripping and mining waste disposal site within existing pit confines.

7. REHANDLE - Previously dumped stripping or mining waste to backfill. Relocation of protore stockpiles.

8. TOPSOIL - Tres Hermanos Sandstone Material used as plant growth media.

9. SUCCESS ANALYSIS - Determination of vegetative cover establishment survival and trend of the plant committee.

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

EXCAVATION

	ITEM	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1)	STRIPPING			
	(a) Contractor	5,624,823	11,415,624	17,040,447
	(b) Anaconda	0	1,762,247	1,762,247
	(c) Total Tons	5,624,823	13,177,871	18,802,694
(2)	MINING WASTE			
	(a) Contractor	4,237,986	4,396,450	8,634,436
	(b) Anaconda	4,038,411*	4,425,454	8,463,865
	(c) Total Tons	8,276,397*	8,821,904	17,098,301
(3)	ORE (.04+)			
	(a) Tons	887,057	755,606	1,642,663
	(b) Grade % U_3O_8	.0990	.1176	.1076
	(c) Cont. Lbs., U_3O_8	1,756,713	1,777,618	3,534,331
(4)	PROTORE (.02-.039)			
	(a) Tons	908,674	749,066	1,657,740
	(b) Grade %U_3O_8	.0283	.0278	.0280
	(c) Cont. Lbs., U_3O_8	513,451	415,949	929,400
(5)	TOTAL TONS	15,696,951*	23,504,447	39,201,398
	(a) Total Contractor Tons			25,674,883
	(b) Total Anaconda Tons			13,526,515

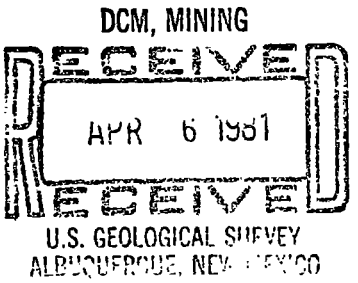
* Includes 32 tons from Woodrow

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

REHANDLE

ITEM	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1) ANACONDA			
(a) State Route 279 Restoration- Stripping Waste from South Paguate		1,080,974	1,080,974
(b) Protore Stockpile 1B to 1E - North Paguate		89,196	89,196
(c) To Rabbit Ears (North Paguate)			
(1) From North Paguate Mining Waste		144,842	144,842
(2) From Stockpile 2F (Mining Waste)		6,143	6,143
(d) From North Paguate to South Paguate - Relocation of Stockpile PLG II to PLG I (Protore)		18,755	18,755
(3) From Jackpile Mining Waste to North Jackpile 32 as Fill for Proposed Underground Mine	276,295		
(2) TOTAL TONS	276,295	1,339,910	1,616,205

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980



OPEN PIT MINE SHIPMENTS RECEIVED BY MILL

ITEM	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1) BLUEWATER			
(a) Tons	1,690,209.20	552,262.70	2,242,471.90
(b) Grade % U_3O_8	.0756	.1227	.0872
(c) Cont. Lbs., U_3O_8	2,556,740.12	1,354,924.47	3,911,664.59
(2) SOHIO			
(a) Tons	0	95,571.36	95,571.36
(b) Grade % U_3O_8	0	.0614	.0614
(c) Cont. Lbs., U_3O_8	0	117,359.91	117,359.91
(3) TOTAL			
(a) Tons	1,690,209.20	647,834.06	2,338,043.26
(b) Grade % U_3O_8	.0756	.1136	.0862
(c) Cont. Lbs., U_3O_8	2,556,740.12	1,472,284.38	4,029,024.50

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

TOTAL MATERIAL HANDLED

ITEM	TOTAL OPEN PIT
(1) Open Pit Excavation	39,201,398.00
(2) Anaconda Rehandle	1,616,205.00
(3) Sub Total Tons	40,817,603.00
(4) Mine Shipments	2,338,043.26
(5) Total Tons	43,155,646.26

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

CONTRACTOR MATERIAL DISTRIBUTION

ITEM	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1) STRIPPING			
(a) To Waste Dumps			
(1) To North Jackpile Dump	2,015,595		2,015,595
(2) To "A" Dump (North Jackpile)	581,916		581,916
(3) Sub Total Tons	2,597,511		2,597,511
(2) STRIPPING			
(a) To Backfill			
(1) To North Jackpile	2,927,312		2,927,312
(2) To South Paguate		8,389,076	8,389,076
(3) To North Paguate		368,452	368,452
(1) To Rabbit Ears		1,034,102	1,034,102
(4) Sub Total Tons	2,927,312	9,791,630	12,718,942
(3) STRIPPING			
(a) To Topsoil Stockpiles (Jackpile & N. Paguate)	100,000	1,440,045	1,540,045
(b) Rabbit Ears (Rabbit Ears)		183,949	183,949
(c) Sub Total Tons	100,000	1,623,994	1,723,994
(4) TOTAL TONS			17,040,447

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

CONTRACTOR MATERIAL DISTRIBUTION

ITEM	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1) MINING WASTE			
(a) To Dumps			
(1) "A" Dump (North Jackpile)	481,389		481,389
(b) Sub Total Tons	481,389		481,389
(2) MINING WASTE			
(a) To Backfill			
(1) To North Jackpile	3,756,597		3,756,597
(2) To South Paguate		3,662,690	3,662,690
(3) To North Paguate		733,760	733,760
(4) Sub Total Tons	3,756,597	4,396,450	8,153,047
(3) TOTAL TONS			8,634,436

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

ANACONDA MATERIAL DISTRIBUTION

ITEM	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1) STRIPPING			
(a) To Waste Dumps			
(1) To South Paguate Dump		370,084	370,084
(2) Sub Total Tons		370,084	370,084
(2) STRIPPING			
(a) To Backfill			
(1) To South Paguate		362,307	362,307
(2) To North Paguate		1,029,856	1,029,856
(3) Sub Total Tons		1,392,163	1,392,163
(3) TOTAL TONS			1,762,247

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

ANACONDA MATERIAL DISTRIBUTION

ITEM	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1) MINING WASTE			
(a) To Backfill			
(1) To South Jackpile	2,730,770		2,730,770
(2) To North Jackpile	1,307,641*		1,307,641
(3) To South Paguate		2,741,783	2,741,783
(4) To North Paguate		1,654,711	1,654,711
(1) Rabbit Ears		28,960	28,960
(5) Sub Total Tons	4,038,411*	4,425,454	8,463,865
(2) TOTAL TONS			8,463,865

*Includes 32 Tons from Woodrow

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

NATURAL GROUND DISTURBED

ITEMS	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1) ACRES DISTURBED			
(a) "A" Dump - North Jackpile	7.5		7.5
(b) Topsoil to Rabbit Ears (North Paguate)		5.4	5.4
(c) Topsoil to North Paguate 33 Area		3.0	3.0
(d) Total Acres Disturbed			15.9

ANACONDA COPPER COMPANY
ANNUAL SURFACE ACTIVITY REPORT
FOR 1980

RE-CAP OF 1980 SURFACE ACTIVITY

ITEM	JACKPILE	PAGUATE	TOTAL OPEN PIT
(1) STRIPPING			
(a) To Waste Dumps	2,597,511	370,084	2,967,595
(b) To Backfill	2,927,312	11,183,793	14,111,105
(c) To Topsoil Stockpiles	100,000	1,623,994	1,723,994
(d) Sub Total Tons	5,624,823	13,177,871	18,802,694
(2) MINING WASTE			
(a) To Waste Dumps	481,389		481,389
(b) To Backfill	7,795,108*	8,821,904	16,616,912
(c) Sub Total Tons	8,276,397*	8,821,904	17,098,301
(3) MINING TO STOCKPILES			
(a) Ore (.04+)	887,057	755,606	1,642,663
(b) Protore (.02-.039)	908,674	749,066	1,657,740
(c) Sub Total Tons			3,300,403
(4) REHANDLE			
(a) To Jackpile	276,295		276,295
(b) To Paguate		1,339,910	1,339,910
(c) Sub Total Tons	276,295	1,339,910	1,616,205
(5) TOTAL ALL EXCAVATION			40,817,603
(6) MINE SHIPMENTS	1,690,209.20	647,834.06	2,338,043.26
(7) TOTAL SURFACE ACTIVITY			43,155,646.26

*Includes 32 tons from Woodrow

ANACONDA COPPER COMPANY
ANNUAL UNDERGROUND MINES ACTIVITY REPORT
FOR 1980

INTRODUCTION - UNDERGROUND

1980 Underground all mines production consisted of 240,209 tons ore at .182% U_3O_8 for 876,325 lbs. U_3O_8 contained. Total waste removed was 32,736 tons, total ore and waste tonnage was 272,945 tons.

The PW-2/3 Underground Mine ID# NM2901720 ceased operations in August of 1980. The mine and area was preserved in a condition so that the training school could utilize these facilities, if needed, at a later date.

Enclosed Maps:
- P-10 1st Level 1980 Production
- P-10 2nd Level 1980 Production
- P-10 3rd Level 1980 Production
- PW-2/3 1980 Production

1980 UNDERGROUND MINE PRODUCTION

MINE	TONS	ORE %U_3O_8	LBS.U_3O_8	WASTE TONS	TOTAL TONS
P-10/7	227,383	.180	817,265	26,976	254,359
PW-2/3	12,826	.230	59,060	5,760	18,586
TOTAL	240,209	.182	876,325	32,736	272,945

1980 MINING STATISTICS

PW-2/3 NM ID# 2901720, Section 33, T 11 N, R 5 W, N.M.P.M.

WORK DESCRIPTION:	FEET	ORE TONS	%U_3O_8	WASTE TONS:	TOTAL TONS:
Trackless Haulage	608	1,082	.252	5,194	6,276
Raising	8			34	34
Development	2,261	3,500	.309	238	3,738
Pillar Extraction		8,244	.194	294	8,538

ANACONDA COPPER COMPANY
ANNUAL UNDERGROUND MINES ACTIVITY REPORT
FOR 1980

1980 MINING STATISTICS (continued)

PW-2/3 NM ID# 2901720, Section 33, T 11 N, R 5 W, N.M.P.M.

WORK DESCRIPTION:	FEET	ORE TONS	$\%U_3O_8$	WASTE TONS:	TOTAL TONS:
Percussion Longhole Drill	5,607				
TOTALS:		12,826	.230	5,760	18,586

P-10/7, NM ID# 2901214, Sections 4,5, & 8, T 10 N, R 5 W, N.M.P.M.

WORK DESCRIPTION:	FEET	ORE TONS	$\%U_3O_8$	WASTE TONS:	TOTAL TONS:
Track Haulage	361	118	.067	1,798	1,916
Conventional Raise	992	172	.083	1,926	2,098
Finger Raise	447	670	.102	276	946
Stope Develop	24,148	38,001	.123	18,797	56,798
Pillar Extraction		188,422	.192	4,179	192,601
Rotary Longhole Drilled	83,256				
Rotary Longhole Probed	62,900				
Percussion Longhole Drilled	77,392				
TOTALS:		227,383	.180	26,976	254,359

All drift advance, raises and pillar extractions were performed by conventional drill and blast methods.

ANACONDA COPPER COMPANY
ANNUAL UNDERGROUND MINES ACTIVITY REPORT
FOR 1980

UNDERGROUND MINE VENTILATION

6918 Radon Daughter samples were taken by Anaconda Copper Company personnel in 1980. Radon exposure records were maintained on 335 people and no one exceeded the limit of four W.L.M. Anaconda employment was terminated for 118 persons during 1980. A Gravimetric Dust Sampling Program was started and a Midget Impinger Dust Sampling Program was reinstated. There were no areas found to exceed the threshold limit by either of these sampling methods. M.S.H.A. installed dust dosimeters on a number of our personnel, no citations issued. A sampling program for airborne uranium was started and the few results that have returned were for all practical purposes, nil. 876 thermoluminescent dosimeter badges were issued during 1980. The badges, detecting Gamma radiation, confirmed that no one exceeded the exposure limit of five Roentgen Equivalent Man (R.E.M.) per year. M.S.H.A. began, but did not complete, one Gamma survey - no citations issued.

MINE SAFETY

M.S.H.A. representatives inspected the Anaconda Copper Company Underground Mining Operations during February, April, May, July, August, and October. Within these six inspections, two radon daughter citations were issued. State representatives did not conduct a radon daughter inspection during 1980. Two complete fire-drills were conducted at the Anaconda Underground Mines.

MINE ENGINEERING

Surveyed reference points on ground surface over existing, or planned underground mining areas continued to be monitored for subsidence by quarterly surveys during 1980. The survey data results indicated no significant ground elevation variation since the original surveys. Pertinent 1980 underground all mines energy consumption statistics include:

(a) 9,632,700 K.W.H.,
(b) 413,650 lbs. dynamite were consumed for a ratio of 1.52 lbs. powder/broken ton; 127,746 electric blasting caps were consumed; December 31, 1980,
(c) 39,980 gallons of #1 diesel was consumed for a ratio of 6.38 broken tons/gal.; 23,525 gallons of propane was used to heat the underground buildings, decline and a vent shaft during the winter months.
(d) The P-10 Mine discharge water totaled 42,852,400 gallons during 1980. The water sampling during the year indicates a 2.41 PPM average U_3O_8 content for a total of 821.02 lbs. U_3O_8 discharged with the mine water.
(e) The total amount of well water pumped at the P-10 Mine was 6,339,000 gallons during 2614.8 hours of pump use. This indicates that the well operated at 40.40 gal./minute during 1980. The original well test in June, 1974 was 33 gal./minute.

ANACONDA COPPER COMPANY
ANNUAL RECLAMATION REPORT
FOR 1980

INTRODUCTION - RECLAMATION

The following report is a summary of Anaconda's reclamation efforts at the Jackpile-Paguate Mine during 1980. Rehabilitation projects completed during 1980 are very limited due to the preparation of a final reclamation proposal to the United States Geological Survey on September 11, 1980.

Enclosed map: Jackpile-Paguate Mine Reclamation Projects Status for 1980. Scale 1" = 400'.

TOPSOILING AND SURFACE WORK (1980)

Topdressing of the southern portion of Dump S was completed during January 1980. This small area comprises approximately 24 acres and is shown on the included reclamation project map. The exposed surface of this site was Mancos Shale mixed with some Dakota Sandstones. The dump was topdressed with at least 24 inches of Tres Hermanos Sandstone from stripping activities in the Rabbit Ears area of North Paguate Pit. The northern slopes were reduced to between 2:1 and 3:1. The slopes were also topsoiled with 2 feet of Tres Hermanos Sandstone plant growth media.

Some erosion control berms, 2 to 3 feet tall, were constructed on the 24 acre portion of S Dump. Additional berms are required on the road passing through the dump and will be constructed following Reclamation Plan approvals. Large rocks were pushed into piles creating habitat for small animals and birds.

Additional Tres Hermanos Sandstone topsoiling material was placed in the stockpile situated on South Dump. Additional topsoiling material was deposited north of Rabbit Ears from stripping activities in the North Paguate area. This increased surface disturbance 8.4 acres.

SEEDING AND MULCHING 1980

No seeding and mulching was completed during 1980 on any topdressed sites due to preparation of the Reclamation Plan submitted September 11, 1980.

STABILIZATION RESEARCH PROJECTS 1980

No stabilization research projects have been initiated during 1980 due to preparation of the Reclamation Plan. However, observation of the 1979 projects has been made. Evaluations of these projects is reviewed in the Success Analysis portion of this report.

ANACONDA COPPER COMPANY
ANNUAL RECLAMATION REPORT
FOR 1980

RECLAMATION SCHEDULE

No formal schedule of reclamation activities can be made at this time. Future rehabilitation activities are dependent on approval of the September 11, 1980 Reclamation Plan by the appropriate regulatory agencies. When a final plan is accepted by all parties involved, a schedule of activities can be formulated.

DRILL HOLE RECLAMATION 1980

Drill hole plugging has been accomplished throughout 1980 on the Jackpile-Paguate Mine Lease. Each hole found was plugged with concrete to a depth of 5 feet, as measured from the hole collar. Each plug has an enlarged cap at the collar of the hole. During 1980, a total of 458 exploration drill holes were plugged on the lease property.

SUCCESS ANALYSIS 1980

The vegetation success analysis program consists of basal cover evaluation, botanical composition and plant density. Basal cover and botanical composition are obtained by the line intercept method. The plant density values were obtained using the frame method, with an area of one square meter. All measurements were taken at random locations and may vary somewhat from year to year.

Vegetation analysis control sites are set up on rangeland areas around the Jackpile-Paguate Mine. These sites are used for comparison of success rates on reclaimed areas to undisturbed rangeland.

Dumps S and J possess basal cover values in excess of the control area. Dumps O, P, P1 and P2 have basal cover values that are 87% of those found on the ungrazed control location. Basal cover on Dumps C, D, E, F and G are between 59% and 64% of the control site. Plant density values ranged from 24% to 85% of the density found on the ungrazed control area. A comparison table of success rates is included in this report.

First growing season visual observations of Dumps X, I, Y_2, L and T indicate seedling emergance is good, particularly for Side Oats Grama (Bouteloua curtipendula) and Fourwing Saltbush (Atriplex canescens).

The slope research project success rates vary greatly with treatment. The paper yarn type blankets placed on Dumps F, I and T in 1979, have completely deteriorated and the test area possesses approximately 5% cover by ocular estimate. The excelsior blankets remain in position and are experiencing expected decomposition. The excelsior blanket test areas had estimated vegetation cover rates of

20-25% consisting, primarily, of Fourwing Saltbush (Atriplex canescens), Crested Wheatgrass (Agropyron cristatum) and grama grasses (Bouteloua spp.). With the upcoming growing season and further deterioration of the matting, an increase in detectable vegetative cover is expected for the excelsior treatment.

Seedlings planted in 1979 on Dumps I, L and K have a survival rate of about 5% with the exception of the Winter Fat (Eurotia lanata) which displays an average 60% survival rate. High temperatures, limited rainfall following planting, burying, rodents and other grazing animals account for the low survival of most of the containerized transplants.

FUTURE SUCCESS MONITORING

Basal cover and density analysis of the dumps planted in the summer of '79 will be conducted this spring and summer. The analysis was delayed due to formulation of the September 11, 1980 Reclamation Plan. Due to the obvious vegetation establishment success on Dumps S and J, these sites will not require additional monitoring. However, a final clipping study is planned this year to assess the grazing carrying capacity of these dumps for future land use planning. All other reclaimed sites will continue to be monitored to evaluate success trends.

VEGETATION SUCCESS

DUMP C,D,E

Reclaimed: Summer 1977

Date of Analysis: November 1980

Species					
Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M^2
*Blue Grama	Bouteloua gracilis	79	49.38	1.30	8.11
*Weeping Lovegrass	Eragrostis curvula	8	5.00	.13	.11
*Fourwing Saltbush	Atriplex canescens	1	.62	.01	1.22
*Crested Wheatgrass	Agropyron cristatum	17	10.63	.28	2.33
*Indian Ricegrass	Oryzopsis hymenoides	17	10.63	.28	2.22
*Sand Dropseed	Sporobolus cryptandrus	20	12.50	.33	--
*Alkali Sacaton	Sporobolus airoides	5	3.13	.08	--
Red Three Awn	Aristida longiseta	3	1.87	.05	.33
Annual Forbs		9	5.62	.15	8.33
Yellow Sweetclover	Melilotus officinalis	1	.62	.01	.45
Winterfat	Eurotia lanata				
Total		160	100.00%	2.62%	23.1

Note: Cover values based on 2 lines, 30.5 M (100 feet) each.

Density values based on 9 quadrats of 1 square meter each.

*Species planted 1977.

VEGETATION SUCCESS

DUMPS F,G

Reclaimed: Summer 1977

Date of Analysis: November 1980

Species

Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M^2
*Blue Grama	Bouteloua gracilis	236	45.74	1.29	5.33
*Fourwing Saltbush	Atriplex canescens	82.0	15.89	.45	3.50
Red Three Awn	Aristida longiseta	12.0	2.33	.06	.17
*Sand Dropseed	Sporobolus cryptandrus	1.0	.19	.01	--
Bottlebrush	Sitanion hystrix	12.0	2.33	.06	--
*Indian Ricegrass	Oryzopsis hymenoides	17.0	3.29	.10	2.0
*Alkali Sacaton	Sporobolus airoides	8.0	1.55	.05	--
Broom Snakeweed	Guitierrezia sarothrae	6.0	1.16	.03	--
*Crested Wheatgrass	Agropyron cristatum	142	27.52	.78	6.0
*Weeping Lovegrass	Eragrostis curvula				
Total		516	100.00%	2.83%	17.0

Note: Cover values based on 6 lines, 30.5 M (100 feet) each.

Density values based on 6 quadrats of 1 square meter each.

*Species planted 1977

VEGETATION SUCCESS

DUMP J

Reclaimed: Summer 1977

Date of Analysis: November 1980

Species					
Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M^2
*Blue Grama	Bouteloua gracilis	282.5	71.34	4.63	38
*Fourwing Saltbush	Atriplex canescens	4	1.01	.07	3
*Weeping Lovegrass	Eragrostis curvula	33.0	8.33	.54	.75
*Sand Dropseed	Sporobolus cryptandrus	17.5	4.42	.29	5.5
*Indian Ricegrass	Oryzopsis hymenoides	10.5	2.65	.17	5.5
*Alkali Sacaton	Sporobolus airoides	30.0	7.58	.49	---
*Crested Wheatgrass	Agropyron cristatum	18.5	4.67	.30	8
Total		396	100.00%	6.49%	60.75

Note: Cover values based on 2 lines, 30.5 M (100 feet) each.

Density values based on 4 quadrats of 1 square meter each.

*Species planted 1977

VEGETATION SUCCESS

DUMPS O, P, P1, P2

Reclaimed: Summer 1977

Date of Analysis: November 1980

pecies

Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Cover Cover %	Density Plants/M^2
*Blue Grama	Bouteloua gracilis	149.5	25.38	.98	10.42
*Fourwing Saltbush	Atriplex canescens	20	3.40	.13	2.5
*Crested Wheatgrass	Agropyron cristatum	346	58.74	2.27	9.42
*Indian Ricegrass	Oryzopsis hymenoides	1	.17	.01	.83
*Sand Dropseed	Sporobolus cryptandrus	9	1.53	.06	.33
*Alkali Sacaton	Sporobolus airoides	63.5	10.78	.42	2.25
Total		589	100.00%	3.87%	25.75

Note: Cover values based on 5 lines, 30.5 M (100 feet) each.

Density values based on 12 quadrats of 1 square meter each.

*Species planted 1977

VEGETATION SUCCESS

DUMP S

Reclaimed: Summer 1976

Date of Analysis: November 1980

Species					
Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M^2
lue Grama	Bouteloua gracilis	160	28.02	1.31	6.25
*Fourwing Saltbush	Atriplex canescens	10	1.75	.08	.56
Little Bluestem	Andropogon scoparius	12	2.1	.10	1.25
*Weeping Lovegrass	Eragrostis curvula	76	13.31	.62	.69
*Sand Dropseed	Sporobolus cryptandrus	14	2.45	.11	.37
Sideoats Grama	Bouteloua curtipendula	228	39.93	1.87	11.75
*Indian Ricegrass	Oryzopsis hymenoides	2	.35	.02	.19
*Alkali Sacaton	Sporobolus airoides	42	7.36	.35	.69
broom Snakeweed	Gutierrezia sarothrae	--	--	--	.88
Annual Forbs		4	.70	.03	.37
*Western Wheatgrass	Agropyron smithii	17	2.98	.14	4.94
Red Three Awn	Aristida longiseta	6	1.05	.05	2.06
Total		571	100.00%	4.68%	30

Note: Cover values based on 4 lines, 30.5 M (100 feet) each.

Density values based on 16 quadrats of 1 square meter each.

*Species planted 1977

VEGETATION SUCCESS

Control Site

Reclaimed: Summer 1977

Date of Analysis: November 1980

Species

Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M^2
Blue Grama	Bouteloua gracilis	173	42.45	1.89	26
ideoats Grama	Bouteloua curtipendula	16	3.93	.18	1.75
Galleta Grass	Hilaria jamesii	62	15.21	.68	20.75
Sand Dropseed	Sporobolus cryptandrus	1.0	.25	.01	--
Bottlebrush	Sitanion hystrix	13	3.19	.14	.25
Ring Muhly	Muhlenbergia torreyi	17.5	4.29	.03	--
Indian Ricegrass	Oryzopsis hymenoides	3	.74	.19	--
Alkali Sacaton	Sporobolus airoides	27	6.63	.29	--
Red Three Awn	Aristida longiseta	22	5.40	.24	.5
nnual Forbs		5.5	1.35	.06	2.25
Black Grama	Bouteloua eriopoda	28	6.87	.31	12.5
Cacti	Opuntia spp.				.25
Broom Snakeweed	Gutierriezia sarothrae	29.5	7.24	.32	7.25
Yucca	Yucca elata	10	2.45	.11	--
Total		407.5	100.00%	4.45%	71.5

Note: Cover values based on 3 lines, 30.5 M (100 feet) each.

Density values based on 4 quadrats of 1 square meter each.

JACKPILE MINE RANGE ANALYSIS

COMPARISON TO CONTROL SITE

1980

Site	% Basal Cover	% of Control Site	Plts/M^2 Plant Density	% of Control Site
C,D,E	2.62	59%	23.1	32%
F,G	2.83	64%	17.0	24%
J	6.49	146%	60.75	85%
O,P,P_1, P_2	3.87	87%	25.75	36%
S	4.68	105%	30.00	42%
Control	4.45	100%	71.5	100%

NEW REVEGETATION SPECIES
EXPERIMENTAL PLOT
VEGETATION SUCCESS

DUMP I

Reclaimed: Summer 1979

Species Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M^2
**Plains Bristlegrass	Setaria macrostachya	63	61.2	1.03	3.75
**Australian Saltbush	Atriplex semibaccata	13	12.6	.21	.5
**Quailbush	Atriplex lentiformis	--	--	--	.25
Sideoats Grama	Bouteloua curtipendula	6	5.8	.10	--
Blue Grama	Bouteloua gracilis	19	18.5	.31	5.50
*Indian Ricegrass	Oryzopsis hymenoides	2	1.9	.03	.25
Total		103	100.0	1.68	10.25

Note: Cover values based on 2 lines, 30.5 M (100 feet) each.

Density values based on 4 quadrats of 1 square meter each.

*Species planted 1979

NEW REVEGETATION SPECIES
EXPERIMENTAL PLOT
VEGETATION SUCCESS

DUMP T

Reclaimed: Summer 1979

Species	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M^2
*Plains Bristlegrass	Setaria macrostachya	22	17.46	.361	2.75
**Australian Saltbush	Atriplex semibaccata	4	3.18	.066	.5
*Weeping Lovegrass	Eragrostis curvula	4	3.18	.066	--
*Sideoats Grama	Bouteloua curtipendula	28	22.22	.459	5.75
Fourwing Saltbush	Atriplex canescens	6	4.76	.098	--
*Indian Ricegrass	Oryzopsis hymenoides	8	6.35	.131	1.0
*Alkali Sacaton	Sporobolus airoides	15	11.90	.246	.75
Blue Gramma	Bouteloua gracilis	23	18.25	.377	3.25
*Crested Wheatgrass	Agropyron cristatum	16	12.70	.262	3.25
Total		126	100.00	2.066	17.25

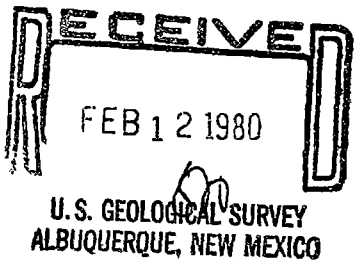
Note: Cover values based on 2 lines, 30.5 M (100 feet) each.

Density values based on 4 quadrats of 1 square meter each.

*Species planted 1979

**Experimental species

ANACONDA Copper Company
New Mexico Operations
P.O. Box 638
Grants, New Mexico 87020
505/876-2211



February 11, 1980

U. S. Geological Survey
P. O. Box 26124
Albuquerque, New Mexico
87125

Attention: Area Mining Supervisor

Dear Sir:

Enclosed are two copies of the Annual Reclamation Report of mining activities of the Anaconda Copper Company, New Mexico Operations for the calender year 1979.

This report is in fulfillment of requirements of 25CFR177.9.

If you have further questions, please contact me.

Sincerely,

Meade A Stirland
Manager, Environment, Health & Safety

MAS/bg

Enclosures

1. Report
2. Map packet

pc: RDL, w/encs.

Maps for this report with mine maps in Flat file. dej

ANNUAL MINING AND RECLAMATION REPORT

ANACONDA COPPER COMPANY

JACKPILE-PAGUATE OPEN PIT AND UNDERGROUND URANIUM MINE

JANUARY 31, 1980

ANACONDA COPPER COMPANY

NEW MEXICO OPERATIONS

CONTENTS

ANACONDA COPPER COMPANY

NEW MEXICO OPERATIONS

INTRODUCTION

This report is a summary of open pit and underground mining activities of the Anaconda Copper Company, New Mexico Operation, for the calender year 1979. Reclamation progress for the Jackpile Paguate Mine during 1979 is also covered in this report. This information fulfills obligations set forth under Title #30 C.F.R., Part 231.11 and Title #25 C.F.R., Part 177.9.

The following addresses annual mining operations progress, areas and tonnages stripped and mined, underground mining and progress and other relative mining activities. The reclamation section describes locations prepared for revegetation, techniques implemented and success. Additional detail concerning locations and developments at the mine are available on the Surface Activity and Underground Workings Maps included with this report.

UNDERGROUND MINING ACTIVITY 1979

GENERAL

1979 Underground all mines production consisted of 274,635 tons ore, at .145% ore grade for 794,004 contained pounds U_3O_8. Total Ore and waste tonnage was 324,278 tons.

1979 UNDERGROUND MINE PRODUCTION

Mine	ORE Tons	Grade	Lbs. U_3O_8	Waste Tons	Total Tons
P-10/7	255,605	.145	742,899	36,828	292,433
P-W-2/3	19,030	.134	51,105	12,815	31,845
Total	274,635	.145	794,004	49,643	324,278

The Alpine Miner was not used during the year 1979. All drift advance in the P-10/7 and P-W-2/3 Mines were driven by conventional drill and blast methods.

The P-10/7 Total waste production of 36,828 tons is distributed in stockpiles according to the following table:

Stockpile	Waste	#4 - 1	Total
% Range	-.020	.020 - .039	
Tons	11,081	25,747	36,828
Average Grade	-	.029	.029*
Lbs. U_3O_8	-	14,933	14,933

* +.020% only

RELATIVE PERTINENT INFORMATION

1. Additional Ventilation Shafts

Two ventilation shafts, 42" I.D. were drilled during September 1979. One in the P-18 area was drilled 585' cased 192'. The other, in the P-18 area was drilled 522' cased 522'.

2. Underground Mine Ventilation

4270 Radon Daughter samples were taken by Anaconda personnel in 1979. Radon exposure records were maintained on 405 people and no one exceeded the limit of (4) four W.L.M. Anaconda employment was terminated for 129 persons during 1979. Eight Hundred Sixty (860) personal dosimeter TLD's badges were used to confirm that no one exceeded the gamma radiation exposure limit of five (5) Roentgen Equilvalent Man (R.E.M.) gamma per year.

3. Mine Engineering

Surveyed reference points on ground surface over existing, or planned underground mining areas continued to be monitored for subsidence by quarterly surveys during 1979. Reports of this monitoring program were submitted to the Area Mining Supervisor each quarter. The survey data results indicated no significant ground elevation variation since the original surveys.

Pertinent 1979 underground all mines energy consumption statistics include:

(a) 9,719,800 K.W.H.

(b) 440,450 lbs. dynamite were used for a ratio of 1.358 lbs. powder/ broken ton; 165,550 electric blasting caps were used.

P-10 Mine discharge water totaled 54,521,450 gallons during 1979. The total amount of well water pumped at the P-10 Mine was 7,947,300 gallons during 3,705.6 hours of pump use.

JACKPILE-PAGUATE OPEN PIT MINING ACTIVITY 1979

SUMMARY OF SURFACE ACTIVITY

Item	Jackpile Mine	Paguate Mine	Total Open Pit
(1) Stripping			
(a) Contractor tons	22,300,312	678,634	33,978,946
(b) Anaconda tons	-0-	5,166,066	5,166,066
(c) Total	22,300,312	5,844,700	28,145,012
(d) Acres Disturbed	40	52	92 acres
(2) Mining Waste			
(a) Contractor tons	8,592,689	2,744,715	11,337,404
(b) Anaconda tons	3,035,242	2,956,005	5,991,247
(c) Total	11,627,931	5,700,720	17,328,651
Ore Anaconda			
(a) tons	763,646	469,732	1,233,378
(b) grade, % U_3O_8	0.0 932	0.0 954	0.0 940
(c) cont. lbs. U_3O_8	1,423,007	896,437	2,319,444
Protore-Anaconda			
(a) tons	820,404	516,704	1,337,108
(b) grade, % U_3O_8	0.0 282	0.0 281	0.0 282
(c) cont. lbs. U_3O_8	462,868	290,281	753,149
Mining - Waste Protore & Ore			
Tons	13,211,981	6,687,156	19,899,137
(3) Total Open Pit Excavation Tons	35,512,293	12,531,856	48,044,149

SUMMARY OF SURFACE ACTIVITY - (continued)

Item	Jackpile Mine	Paguate Mine	Total Open Pit
(4) Stripping tons to waste dumps			
(a) N. Jackpile dump 46 acres dist.	17,839,966 46		17,839,966 46
(b) Gavilan Mesa dump 10 acres dist.	2,335,810 10		2,335,810 10
(c) "B" Dump	53,375*		53,375
(d) "A" Dump (side)	64,000*		64,000
(e) "A" Dump exp. 5 acres dist.	1,472,007 5		1,472,007 5
(f) "Q" Dump		39,220*	39,200
(g) "R" Dump		303,750*	303,750
(h) Existing S.E. Paguate Dump		42,000	42,000
Total tons	21,765,158	384,970	22,150,128
Total Acres Dist.	61 acres	-0-	61 acres

* Suitable topsoil material in stripping that was utilized to side-coat these existing dumps.

SUMMARY OF SURFACE ACTIVITY - (continued)

Item	Jackpile Mine	Paguate Mine	Total Open Pit
(5) Stripping tons to Backfill			
(a) To SJ-3,12	535,154		535,154
(b) To S. Paguate from SP-16 18 acres backfilled		2,770,720	2,770,720
(c) To S. Paguate from SP-25,30		1,376,586	1,376,586
Total Stripping to Backfill	535,154	4,147,306	4,682,460
Acres Backfilled	-0-	18 acres	18 acres
(6) Ore associated waste to backfill *			
(a) To NJ-2,5	5,160,532		5,160,532
(b) To SJ-3,12	4,583,995		4,583,995
(c) To S. Jackpile Stockpile area	192,981		192,981
(d) To. S. Paguate from SP-9 5 acres backfilled		760,639	760,639
(e) To N. Paguate from NP-15 & Rem.		993,401	993,401
(f) From SP-20 to existing backfill in pit bottom		125,434	125,434
(g) From SP-16 to SP-9 and South Paguate		3,821,246	3,821,246
Total	9,937,508	5,700,720	15,638,228
(7) Mining waste** to waste dumps	1,690,423		1,690,423
Total	1,690,423		1,690,423

* Jackpile Sandstone that is less than 0.02% U_3O_8.

** This "mining waste" material is an accounting definition and does not contain any radioactive Jackpile Sandstone. It is composed of non-radioactive shales.

SUMMARY OF SURFACE ACTIVITY - (continued)

Item	Jackpile Mine	Paguate Mine	Total Open Pit
(8) Ore & Protore Stockpiling	1,584,050	986,436	2,570,486
No New Acreage Disturbed			
(9) Topsoil Stockpiling	-0-		
(a) S. Paguate- new stockpile on existing backfill and some natural ground 7 acres dist.		1,001,875	1,001,875
(b) To existing N. Paguate stockpile		90,549	90,549
(c) To existing S. dump stockpile		122,000	122,000
Total	-0-	1,312,424 7 acres dist.	1,312,424 7 acres dist.
(10) Ore shipped for processing	596,881	1,638,511	2,235,392
Total	596,881	1,638,511	2,235,392

RE-CAP OF 1979 SURFACE ACTIVITY

Item	Jackpile	Paguate Mine	Total Open Pit
(1) Stripping			
(a) to waste dump	21,765,158	384,970	22,150,128
(b) to backfill	535,154	4,147,306	4,682,460
(c) to topsoil stockpile	-0-	1,312,424	1,312,424
Total Tons	22,300,312	5,844,700	28,145,012
Total acres dist.	101	70	171
(2) Mining waste			
(a) to backfill	9,937,508	5,700,720	15,638,228
(b) to waste dumps	1,690,423	-0-	1,690,423
Total	11,627,931	5,700,720	17,328,651
(3) Protore Mining to stockpile	820,404	516,704	1,337,108
(4) Ore Stockpiling	763,646	469,732	1,233,378
Total - All Excavation	35,512,293	12,531,856	48,044,149

DEFINITION OF TERMS

(1) Stripping - Overburden removal to within ± 30 feet of "Jackpile" Sandstone.

(2) Mining waste - Accounting definition of waste material above "Jackpile" Sandstone. This waste material does not contain any radioactive sandstone.

(3) Ore associated waste - Ore associated Jackpile Sandstone that is less than 0.02% U_3O_8;

(4) Protore - Ore associated Lo-Grade material that ranges from .02 - .039% U_3O_8; stockpiled separately.

(5) Ore - Jackpile Sandstone that is .04+% U_3O_8.

(6) Waste dump area - Stripping and mining waste (a) Disposal site that is outside existing pit confines.

(7) Backfill area - Stripping and mining waste disposal site within existing pit confines.

TOPSOILING AND SURFACE WORK (1979)

Topdressing of dumps X and I was completed by April 1979. The topsoiling material is Tres Hermanos Sandstone. Investigations of the Tres Hermanos unit reveal that it possesses the most favorable characteristics for plant establishment at the Jackpile Mine. The finish work on the dumps included topsoil capping of the north slopes of I and X. The lower deck of X was also topdressed. The cover in all areas was at least 24 inches thick. Soil for topdressing of X and I slopes was transported from an adjacent dump where favorable material was located. Ongoing soil analysis of the cover material revealed no phytotoxic properties. Water erosion control systems, consisting of soil berms, were constructed on dumps X, I and Y2 in areas with a declining grade. Berms were also constructed along the crest of all the dumps. The east slopes of dump T were topdressed with soil hauled from the topsoil stockpile near the Rabbit Ears area.

Scarification of dump top surfaces on X, I, Y2, L and K was accomplished during the summer of 1979, just prior to seeding the sites. The seedbed was prepared by the use of a roller with protrusions that create punctures in the soil. These punctures or small holes are microsite environments that catch water and promote vegetation establishment. The seedbed of dump T was prepared with a rangeland type disc harrow. Large rocks were pushed into piles creating habitat for small mammals and birds on all the dumps worked in 1979.

SEEDING AND MULCHING (1979)

The 1979 summer planting program began June 18,1979 and was completed by August 31, 1979, The dumps planted included X, I, Y2, T, L and K for a total of 150 acres. Prior to seeding, the dumps were fertilized with 40 lbs/ac of Nitgrogen and 30 lbs/ac of Phosphorus. A small disc harrow was run over the soil to mix in the fertilizer.

SEEDING AND MULCHING (1979) - (continued)

Seeding and mulching was completed on all dump sites. Dumps L, K, I, Y2 and the majority of X were seeded with eight native grass and shrub species (Fig. 1). The seed was drilled into the soil at a rate of 8 to 10 lbs/ac. Dump T and 9 acres of dump X were seeded at a rate of 20 lbs/ac. A large percentage of seed does not germinate due to predation by birds and small mammals. Harsh climatological conditions are also a great stress. This increased rate will allow some compensation for these losses. All areas will be monitored for vegetation densities and rate feasiblility. Seed was broadcast into the rocky inaccessible areas. All planted acreage was mulched with barley straw at a rate of 2 tons per acre. The straw was crimped into the soil to prevent erosion loss. Approximately 10 acres of dump D and E were reseeded. Following an inspection in spring it was decided that reseeding with grasses was needed because of poor grass establishment on the dumps. The locations seeded were not tilled up because of existing Fourwing Saltbush plants. The seed was drilled over existing vegetation as to not lose established stands of the small shrubs. Blue Grama, Alkali Sacaton, Indian Ricegrass and Crested Wheatgrass were the species planted on dumps D and E during late July.

STABILIZATION RESEARCH PROJECTS (1979)

1. Erosion Control Blanket Project (1979)

   A total of 28,314 square feet (.65ac) of Curlex and paper yarn erosion control blankets were placed on the slopes of dumps E, G, I and T. These blankets were placed on sites displaying signs of considerable erosion. The purpose of these blankets is to temporarily stabilize the slope area prone to erosion and establish vegetation. The blankets also retain moisture

STABILIZATION RESEARCH PROJECTS (1979) - (continued)

Erosion Control Blanket Project (1979) - (continued)

and reduce soil surface temperatures.

The two types that were experimented with are the Curlex blanket which consists of wooden excelsior matting and plastic netting. The second blanket type is the Hold-Grow blanket, constructed of paper strips woven with nylon yarn.

The blankets were installed during June and July of 1979. Each area was seeded at a rate of 40 lbs/acre with the 1978-79 seed mixture. The blankets were rolled out over the crest of the dump and staked down. Year end results find that the Curlex blankets promote germination superior to that of the paper-yarn type. The Curlex blankets withstood the elements far better than the paper yarn blankets. The blankets have prevented erosion on the slope area where used and will probably last through the winter and early spring before deteriorating. Preliminary success observations have been made (Fig. 2) and the plots will be added to our range analysis program next year to evaluate establishment after one complete growing season.

2. Seedling Transplants (1979)

Seedling raised under greenhouse conditions were planted onto dumps I, L and K. Seedlings on I dump were planted during the week of August 17, 1979 after several days of rain. Alkali Sacaton grass seedlings, Quail-bush and Fourwing Saltbush seedlings were all planted on the east slope of dump I. The seedlings were planted on the slope along the crest of the dump. This will allow a seed source for the lower portions of the slope. Three rows approximately 25 feet apart were planted with seedling spacing of 5 feet. The seedlings were watered when planted and mulched. Plant survival of the three species on dump I as of September 12, 1979 was 70 percent (Fig. 4).

STABILIZATION RESEARCH PROJECTS (1979) - (continued)

Seedling Transplants (1979) - (continued)

Quailbush and Alkali Sacaton were planted across the crest of the north and east slopes of dump K. The planting pattern is similar to that used on dump I. Quailbush, Winter Fat, Fourwing Saltbush and Alkali Sacaton were planted on the south east and west slopes of dump L. All seedlings were planted on L and K during the week of August 27, 1979. The planting pattern is in three rows 25 feet apart laterally and seedlings set at 10 feet. All species have survived well; 75% of the seedlings planted are alive as of September. 12, 1979.

3. New Species Planted (1979)

Four species were experimented with in 1979 for revegetation success at the Jackpile Mine this growing season. Australian Saltbush, Quailbush, Buffelgrass and Plains Bristlegrass were all planted on dump top surfaces on a small scale. The sites are located on dumps X and T. The plots were broadcast seeded at a rate of 18 to 20 lbs/acre. No irrigation is to be used. The test areas were mulched, with a ground cover of approximately 2 inches. The plot sizes are 1/2 acre. Some sparse stands of grass and shrub seedlings have germinated on the two dump test plots. The extensive measurement of germination and growth success will be conducted next year after one complete growing season.

SUCCESS ANALYSIS (1979)

Vegetation establishment and success analysis began in 1979 for all reclaimed sites. The analysis includes relative cover, botanical composition and density. Cover and composition are obtained by the Line Intercept method. The density values were obtained using a frame method, with an area of one square meter. Details are on each sites analysis sheet.

Three vegetation success control sites were set up on undisturbed areas around the Jackpile-Paguate Mine. The control areas include a mesa top rangeland site, a mesa toe area site and a valley rangeland site.

The basal cover for species growing on dumps S, J, O, P, PI and P2 is superior to the cover values of the mesa toe and the valley rangeland sites. There is also more species variety on dumps S and J than the valley and mesa top control areas. Dumps S and J are almost equal in basal cover to the mesa top that is free of grazing livestock. Dumps O, P, PI and P2 possess basal cover values that are 77% of that found on the mesa top ungrazed control area. The average basal cover value for dumps C, D, E, F and G is 45% of that found on the grazed control sites.

Density values for dumps S, J, O, P, PI and P2 are 44% of the average density found on the control sites. Dumps C, D, E, F and G have 19% of the density found in the surrounding rangeland control areas. Poor success of vegetation establishment on dumps C, D, E, F and G appears to be due to the lack of adequate moisture for germination. Plans have been made to reseed select areas of these dumps in 1980.

SUCCESS ANALYSIS (1979) - (continued)

The trend of cover and density for dumps S, J, O, P, PI and P2 is consistant with the goals of our reclamation project in restoring the disturbed areas back to productive rangeland. Dumps X, I, Y2, L, K and T will be analyzed for success after one complete growing season. This analysis will be reported in the 1980 annual reclamation report.

RECLAMATION SCHEDULE

The reclamation schedule may be modified following a waste materials handling study being completed by Pincock, Allen and Holt Consultants. The information compiled in this research project will allow land disturbance features to be effectively scheduled for the most appropriate mode of reclamation. The Pincock, Allan and Holt study will be completed in February of 1980.

FIGURE 1

SEED MIXTURES FOR 1978 AND 1979

Genus & Species	Common Name	% of Mixture
Bouteloua gracilis	Blue Grama (Lovington)	30
Bouteloua curtipendula	Sideoats Grama (Vaughn)	10
Oryzopsis hymenoides	Indian Ricegrass (Paloma)	10
Agropyron disertar	Western Wheatgrass	10
Atriplex canescens	Fourwing Saltbush	5
Sporobolus airoides	Alkali Sacaton	15
Eragrostis curvula	Weeping Lovegrass	15
*Melilotus officinales	Yellow Sweetclover	5
		100%

*The legume is included in the mixture because of its ability to fix atmospheric nitrogen in the soil.

FIGURE 2

STABILIZATION RESEARCH PROJECTS

EROSION CONTROL BLANKET APPLICATION

Site	Type	Seeding Rate	Preliminary Observation 12-1-79	Acres
Dump I	Curlex	40 lbs/ac.	Blanket holding up well Germination good	0.2
	Paper	40 lbs/ac.	Blanket deteriorating and coming loose Germination poor	.138
Dump E	Curlex	40 lbs/ac.	Blanket holding up well Germination fair	0.054
	Paper	40 lbs/ac.	Blankets loose and deteriorating Germination poor	0.065
Dump T	Curlex	40 lbs/ac.	Blanket holding up well Germination good	0.1
	Paper	40 lbs/ac.	Blanket deteriorating and detached Germination poor	0.06
Dump G	Curlex	40 lbs/ac.	Blanket holding up well Germination fair	.031
				.65
				(28,314 sq ft)

Note: The plots were not irrigated; the only moisture was from rainfall.

FIGURE 3

NEW REVEGETATION SPECIES (1979)

Genus & Species	Common Name	% of Mixture
Atriplex semi baccata	Australian Saltbush	16
Atriplex lentiformis	Quailbush	16
Cenchius celiaris	Buffelgrass	16
Setaria machrostachya	Plains Bristlegrass	52
Total		100

The above species are eminent for their hardiness and ability to survive and propagate under harsh conditions.

NEW SPECIES PLANTED 1979

Site	Mulch	Preliminary Observation	Acres
Dump X	1 Ton	Nurse crop germinated on 7-9-79, sparse germination of test grasses and shrubs as of 12-1-79. Success analysis following one seasons growth.	0.5
Dump T	1 Ton	Nurse crop germinated on 9-7-79, sparse germination of test grasses as of 12-1-79. Success analysis following one seasons growth.	0.58
			1.08

FIGURE 4

SEEDLING TRANSPLANTS 1979

Site	Genus & Species	Common Name	Number of Seedlings	Preliminary Observation	Acres
Dump I	Atriplex lentiformis	Quailbush	50	All species greater than 70% survival as of 9-12-79	0.8
	Sporobolus airoides	Alkali Sacaton	50		
	Atriplex canescens	Fourwing Saltbush	50		
Dump L	Sporobolus airoides	Alkali Sacaton	56	All species greater than 75% survival as of 9-12-79	0.9
	Eurotia spp.	Winter Fat	58		
	Atriplex lentiformis	Quailbush	56		
	Atriplex canescens	Fourwing Saltbush	56		
Dump K	Sporobolus airoides	Alkali Sacaton	23	All species greater than 75% survival as of 9-12-79	0.1
	Atriplex lentiformis	Quailbush	23		

RECLAMATION WORK COMPLETED IN 1979

Site *1	Acreage	Type of Cover	Amount of Cover	Technique	Remarks
Dump X	18	Tres Hermanos Sandstone small amounts of shales in some areas.	A minimum of 24 inches.	The northern lower deck and slopes topsoiled in 1979. Additional erosion control berms installed in 1979. Fertilized, Seeded & Mulched.	Grass and shrub species germinating. Success monitoring will be accomplished in 1980.
Dump I	40	Tres Hermanos Sandstone small amounts of shales on some slopes.	A minimum of 24 inches.	Slopes topsoiled in 1979. Erosion control berms constructed. Fertilized, Seeded & Mulched.	Same as Dump X
Dump Y2	12	Tres Hermanos Sandstone	18 to 24 inches of topsoil, covered in 1978.	Fertilized, Seeded & Mulched.	Same as Dump X
Dump T	26	Tres Hermanos Sandstone	18 to 24 inches of topsoil, covered in 1977.	Fertilized, Seeded & Mulched.	Same as Dump X
Dump L	40	Tres Hermanos Sandstone and some shales	Minimum of 24 inches thick graded in 1978.	Fertilized, Seeded & Mulched.	Same as Dump X
Dump K	13	Tres Hermanos Sandstone	Minimum of 24 inches thick, graded in 1978.	Fertilized, Seeded & Mulched.	Same as Dump X
Dumps D & E	10	Tres Hermanos Sandstone and some shales	Minimum of 24 inches thick, graded in 1977.	Reseeded	Reseeded due to poor success. Some grass seedlings germinating. Continued success monitoring will be accomplished in 1980.
Research Projects 3.5 *2					

162.5 acres received reclamation work in 1979.

*1 Refer to Surface Activity Map (1979) for site locations.
*2 For detail refer to Figures 2, 3 & 4.

VEGETATION SUCCESS

DUMP S

Reclaimed: Summer 1976

Date of Analysis: October 1979

Species Common Name	Scientific Name	Botanical Composition %	Basal Area Cover %	Total Cover (cm)
*Blue Grama	Bouteloua gracilis	18.64	1.60	245.25
*Side Oats Grama	Bouteloua curtipendula	10.78	0.93	141.9
*Galleta Grass	Hilaria jamesii	0.57	0.04	7.6
*Little Bluestem	Andropogon scoparius	1.45	0.12	19.1
*Indian Ricegrass	Oryzopsis hymenoides	3.0	0.26	40.0
*Sand Dropseed	Sporobolus cryptandrus	5.7	0.5	75.0
*Weeping Lovegrass	Eragrostis curvula	6.0	0.52	79.0
*Alkali Sacaton	Sporobolus airoides	8.58	0.74	113.0
Spike Muhly	Muhlenbergia wrightii	0.45	0.04	6.0
Three Awn	Aristida longiseta	13.87	1.2	182.5
Fourwing Saltbush	Atriplex canescens	12.54	1.1	165.0
*Yellow Sweetclover	Melilotus officinalis	0.53	0.05	7.0
Broom Snakeweed	Gutierrezia spp.	2.67	0.23	32.25
Summer Cyprus	Kochia scoparia	0.76	0.06	10.0
Russian Thistle	Salsola kali	14.3	1.24	189.0
Total		100	8.63	1312.6

Note: Cover values based on 5 lines, 30.5 M (100 feet) each.
*Species planted 1976

VEGETATION SUCCESS

DUMP S

Reclaimed: Summer 1976

Date of Analysis: October 1979

Species

Common Name	Scientific Name	Density (Plants/M^2)
Blue Grama	Bouteloua gracilis	9.82
Sideoats Grama	Bouteloua curtipendula	10.00
Indian Ricegrass	Oryzopsis hymenoides	.36
Alkali Sacaton	Sporobolus airoides	1.23
Sand Dropseed	Sporobolus cryptandrus	1.23
Spike Dropseed	Sporobolus spicitum	.77
Western Wheatgrass	Agropyron smithii	4.55
Weeping Lovegrass	Eragrostis curvula	.82
Three Awn	Aristida longiseta	1.27
Fourwing Saltbush	Atriplex canescens	1.45
Russian Thistle	Salsola kali	.77
Broom Snakeweed	Gutierrezia sarothrae	.41
Annual Forbs		.18
Yellow Sweetclover	Melilotus officinales	.364
Little Bluestem	Andropogon scoparius	.51
	Total Density Plants/M^2	33.734

Note: Density values based on 11 quadrants of 1 square meter.

VEGETATION SUCCESS

DUMPS C, D, E

Reclaimed: Summer 1977

Date of Analysis: October 1979

Species		Total Cover (cm)	Botanical Composition %	Basal Area Cover %
Common Name	Scientific Name			
*Blue Grama	Bouteloua gracilis	52	11.040	.341
*Fourwing Saltbush	Atriplex canescens	94	19.957	.616
*Indian Ricegrass	Oryzopsis hymenoides	16	3.397	.105
Spike Dropseed	Sporobolus spicitum	37	7.856	.243
*Alkali Sacaton	Sporobolus airoides	10	2.123	.065
*Crested Wheatgrass	Agropyron disertar	11	2.335	.072
Three Awn	Aristida longiseta	151	32.060	.990
Rubber Rabbitbrush	Chrysothamnus nauseosus	29	6.157	.190
Stickleaf	Lappula spp.	15	3.185	.098
Annual Forbs		56	11.89	.367
Total		471	100.00	3.087

Note: Cover values based on 4 lines, 30.5 M (100 feet) each.

*Species planted 1977

VEGETATION SUCCESS

DUMPS C, D, E

Reclaimed: Summer 1977

Date of Analysis: October 1979

Species

Common Name	Scientific Name	Density Plants/M^2
Blue Grama	Bouteloua gracilis	3.2
Fourwing Saltbush	Atriplex canescens	1.06
Indian Ricegrass	Oryzopsis hymenoides	3.53
Spike Dropseed	Sporobolus spicitum	0.66
Alkali Sacaton	Sporobolus airoides	0.40
Crested Wheatgrass	Agropyron disertar	0.73
Three Awn	Aristida longiseta	2.66
Bottlebrush Squirreltail	Sitanion hystrix	0.26
Ring Muhly	Muhlenbergia torreyi	0.40
Broom Snakeweed	Gutierrezia sarothrae	0.40
Russian Thistle	Salsola kali	2.26
Rubber Rabbitbrush	Chrysothamnus nauseosus	0.2
Annual Forbs		0.4
Weeping Lovegrass	Eragrostis curvula	0.20
Juniper	Juniperus monosperma	0.13
	Total Density Plants/M^2	16.5

Note: Density values based on 15 quadrats of 1 $meter^2$.

VEGETATION SUCCESS

DUMP F

Reclaimed: Summer 1977

Date of Analysis: October 1979

Species Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %
*Blue Grama	Bouteloua gracilis	115	27.123	.754
*Fourwing Saltbush	Atriplex canescens	80	18.868	.525
*Crested Wheatgrass	Agropyron disertar	104	24.528	.682
*Indian Ricegrass	Oryzopsis hymenoides	15	3.538	.098
*Alkali Sacaton	Sporobolus airoides	6	1.415	.039
*Weeping Lovegrass	Eragrostis curvula	5	1.179	.033
Annual Forbs		99	23.349	.65
Total		424	100.00	2.781

Note: Cover values basedon 5lines, 30.5 M (100 feet) each.

*Species planted 1977

VEGETATION SUCCESS

DUMP F

Reclaimed: Summer 1977

Date of Analysis: October 1979

Species

Common Name	Scientific Name	Density (Plants/M^2)
Blue Grama	Bouteloua gracilis	5.44
Indian Ricegrass	Oryzopsis hymenoides	0.31
Spike Dropseed	Sporobolus spicitum	0.13
Weeping Lovegrass	Eragrostis curvula	0.19
Crested Wheatgrass	Agropyron disertar	6.31
Bottlebrush Squirreltail	Sitanion hystrix	0.06
Three Awn	Aristida longiseta	9.81
Fourwing Saltbush	Atriplex canescens	3.82
Rubber Rabbitbrush	Chrysothamnus nauseosus	0.12
Annual Forbs		0.19
	Total Density Plants/M^2	26.38

Note: Density values based on 16 quadrants of 1 square meter.

VEGETATIONAL SUCCESS

DUMP G

Reclaimed: Summer 1977

Date of Analysis: October 1979

Species

Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %
*Blue Grama	Bouteloua gracilis	50.5	23.112	.552
*Fourwing Saltbush	Atriplex canescens	40.0	18.307	.437
*Crested Wheatgrass	Agropyron disertar	75	34.325	.82
*Indian Ricegrass	Oryzopsis hymenoides	10	4.577	.11
*Weeping Lovegrass	Eragrostis curvula	10	4.577	.11
Spike Dropseed	Sporobolus spicitum	1	.457	.011
Annual Forbs		32	14.645	.35
Total		218.5	100.00	2.39

Note: Cover values basedon 3 lines, 30.5 M (100 feet) each.

*Species planted 1977

VEGETATION SUCCESS

DUMP G

Reclaimed: Summer 1977

Date of Analysis: October 1979

Species

Common Name	Scientific Name	Density (Plants/M^2)
Blue Grama	Bouteloua gracilis	3.625
Sideoats Grama	Bouteloua curtipendula	1.125
Indian Ricegrass	Oryzopsis hymenoides	0.75
Alkali Sacaton	Sporobolus airoides	.25
Western Wheatgrass	Agropyron smithii	.25
Crested Wheatgrass	Agropyron disertar	10.25
Little Bluestem	Andropogon scoparius	.125
Fourwing Saltbush	Atriplex canescens	3.625
Yellow Sweetclover	Melilotus officinales	.25
Stickleaf	Lappula spp.	.12
	Total Density Plants/M^2	20.37

Note: Density values based on 8 quadrants of 1 square meter.

VEGETATION SUCCESS

DUMP J

Reclaimed: Summer 1977

Date of Analysis: October 1979

Species

Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M_2
*Blue Grama	Bouteloua gracilis	348.5	65.94	5.7	51.30
*Fourwing Saltbush	Atriplex canescens	59.0	7.38	0.64	9.50
*Weeping Lovegrass	Eragrostis curvula	82.0	15.52	1.3	2.75
*Sand Dropseed	Sporobolus crytandrus	21.0	3.97	0.34	-
Spike Dropseed	Sporobolus spicitum	14.0	2.65	0.23	5.50
*Indian Ricegrass	Oryzopsis hymenoides	7.0	1.32	0.12	3.75
*Alkali Sacaton	Sporobolus airoides	11.0	2.08	0.20	2.00
Russian Thistle Annual Forbs		6.0	1.14	0.1	-
*Crested Wheatgrass	Agropyron disertar	-	-	-	6.00
Total		528.5	100.00	8.63	80.8

Note: Cover values based on 5 lines, 30.5 M (100 feet) each.
Density values based on 4 quadrats of 1 square meter each.
* Species planted 1977

VEGETATION SUCCESS

DUMPS O, P, P1, P2

Reclaimed: Summer 1977

Date of Analysis: October 1979

Species

Common Name	Scientific Name	Total Cover (cm)	Botanical Composition %	Basal Area Cover %	Density Plants/M_2
Blue Grama	Bouteloua gracilis	169	27.93	1.85	12.7
Fourwing Saltbush	Atriplex canescens	115	19.00	1.257	4.6
Crested Wheatgrass	Agropyron disertar	233	38.51	2.55	15.3
Indian Ricegrass	Oryzopsis hymenoides	2	0.33	.022	0.2
Sand Dropseed	Sporobolus crytandrus	3	0.49	.033	1.2
Alkali Sacaton	Sporobolus airoides	10	1.65	.110	2.6
Annual Forbs		73	12.06	.798	3.8
Total		605	100	6.62	40.4

Note: Cover values based on 4 lines, 30.5 M (100 feet) each.

Density values based on 10 quadrats of 1 square meter each.

* Species planted 1977

ANACONDA

January 31, 1979

Mr. A. F. Czarnowsky
Area Mining Supervisor
U.S. DEPARTMENT OF INTERIOR
GEOLOGICAL SURVEY - CONSERVATION DIVISION
P. O. Box 26124
Albuquerque, New Mexico 87125

Re: Annual Reclamation Report - 1978

Dear Mr. Czarnowsky:

Enclosed are two copies of the Annual Reclamation Report on mining activities of the Anaconda Copper Company, New Mexico Operations, for the calendar year 1978.

This report is in response to requests made by yourself and Mr. Marc Nelson of your office and in fulfillment of the requirements of 25 CFR 177.9.

If you have further questions, please contact Mr. Elrod C. Leany at (505) 876-2211, extension 237.

Sincerely,

R.D. LYNN
General Manager

RDL/jms
Encls.

Maps for report with mine maps in flat file

The Anaconda Company **New Mexico Operations** Mineral Resources Group P.O. Box 638 Grants, New Mexico 87020 505/876-2211

ANACONDA COPPER COMPANY
NEW MEXICO OPERATIONS

ANNUAL RECLAMATION REPORT FOR 1978

The Anaconda Copper Company conducted mining and reclamation activities on the Jackpile-Paguate Mine, Pueblo of Laguna Uranium Leases 1, 4 and 8, Laguna Indian Reservation, Townships 10 and 11 North, Range 5 West, NMPM, Valencia County, New Mexico, during the 1978 calendar year.

Mining operations on the Laguna lease were conducted in both underground and open pit mines, and surface drilling activity was conducted in areas adjacent to all mines. Reclamation work was done on completed waste dump surfaces as described in this report.

The status of mining activity at the end of 1977 is shown on the Surface Activity for 1977 - Base Map. Surface Activity for 1978 (Sheet 1) shows mining, stripping and ore stockpiling activity as of December 31, 1978. Surface Activity for 1978 (Sheet 2) shows waste, stripping, backfill areas and topsoil stockpiling as of December 31, 1978. Areas of reclamation, as described in this report, are shown on Sheet 2.

The underground mines which were operated during 1978 were the P-10/7 and PW-2/3, from which a total of 300,449 tons were mined. This consisted of 246,468 tons of ore and 53,981 tons of discard that was disposed of in an existing waste dump. No additional ground surface disturbance was caused by underground mining operations during 1978.

Open pit mining operations during 1978 were conducted in five areas in the Jackpile and Paguate mines from which 35,113,972 tons of ore and discard were mined. The ore was handled through thirteen active stockpiles that were established prior to 1978 to receive ore from the mining operations and

from which shipments to mill process were made.

Of the total discard, 64% (21,419,069 tons) was backfilled in four major mined-out areas (105 acres), 1% (216,000 tons) was placed on one existing waste dump, 26% (8,926,406 tons) was placed on three new dumps (82 acres), and 9% (2,885,200 tons) went into two topsoil stockpiles for future use in reclamation work, of which 1,011,900 tons were placed on an existing stockpile and 1,873,300 tons were placed on a new stockpile on 21 acres.

The new areas affected by the open pit mining operations in 1978 were in the Jackpile and Paguate mines and their immediate vicinities. The land was affected by the disturbance of 107 acres by excavation, 82 acres by waste dumps and 21 acres by temporary topsoil stockpiles. A total of 123 acres were reclaimed in 1978.

SUMMARY OF SURFACE OPERATION

1. Stripping:

   (a) Total Tonnage = 23,527,997 tons
   (b) Acres Disturbed = 107 acres.

2. Mining:

   (a) Tons Ore = 1,667,297 tons
   (b) Tons Protore = 1,338,776 tons
   (c) Tons Mining Waste = 8,579,902 tons
   (d) Total Mining - 11,585,975 tons.

3. Open Pit Excavation:

   (a) Total = 35,113,972 tons

4. Tonnage to Waste Dumps:

   (a) Existing = 216,000 tons

(b) New Dumps = 8,926,406 tons
(c) Acres Disturbed by New Dumps = 82 acres*

5. Tonnage to Backfill:

(a) Jackpile = 6,115,893 tons
(b) Paguate = 13,964,400 tons
(c) Acres Backfilled--Jackpile Pit = 56 acres*
(d) Acres Backfilled--Paguate Pit = 49 acres*

6. Total Ore & Protore Stockpiling:

(a) Tons Stockpiled = 3,006,073 tons
(b) No New Acreage Disturbed.

7. Ore Shipped for Processing:

(a) Total = 1,769,883 tons

8. Ore Remaining in Stockpile:

(a) Total = 1,236,190 tons

9. Topsoil Stockpiling:

(a) Paguate = 1,011,900 tons to existing pile
(b) Jackpile = 1,873,300 tons to new stockpile
(c) Acres Disturbed by New Stockpile = 21 acres*

10. Reclamation:

(a) Acres Prepared (graded & topdressed) = 123 acres

(* NOTE: For site locations refer to the Surface Activity 1978 Map, Sheet 2)

The Anaconda Company's reclamation program at the Jackpile-Paguate mine began in full force in 1976. The primary objective of the program is to rehabilitate waste dumps, open pits, ground surfaces presently covered by ore stockpiles, roads and storage areas for use as productive rangeland. The following information describes locations prepared for revegetation and the stabilization technique implemented. This report includes reclamation work

completed in 1978 and also an update on all past reclamation done at the Jackpile-Paguate Mine. Research work concerning methods of slope stabilization is also included.

Backfill

The locations that have been backfilled are shown on Surface Activity for 1978 (Sheet 2). The volumes that have been filled in the Paguate Pit are filled up through the Jackpile formation. The figures given below are total tons backfilled as of December 31, 1978.

AREA	Tons of Material Backfilled to Year-end 1978
Jackpile Pit	30,277,300
Paguate Pit (north and south)	26,955,424

Stabilizing Technique (1978)

The existing cover on Dumps L and K (refer to 1978 Surface Activity Map for site locations) is primarily Tres Hermanos sandstone, and soil analysis displayed no phytotoxic properties in this material. The surface and slopes were prepared by bulldozers and graders. Small amounts of soil were hauled in by scraper to cover the access ramp and construct water catchment berms. Large rocks were pushed into piles creating habitat for small birds and mammals.

Portions of Dumps X, I and Y_2 (approximately 70 acres) are presently being prepared for seeding. Soil is being transported onto the site from an adjacent dump where favorable material was located. Soil analysis of this material revealed no phytotoxic properties. The seedbed is still under

construction and the erosion control system will be completed near the first of the year.

Slopes (1978)

Landscape surrounding the Jackpile mine contains steep, sometimes vertical, slopes that support little vegetation. Many slopes at the Jackpile mine are more gentle than surrounding terrain and, thus, fit into the general topography of the area. Physical and vegetative methods to stabilize these slopes are currently being implemented or being considered for pilot programs at the mine.

When available, large aggregates are deposited on dump slopes. Dumps L, K, and part of I have had large aggregates dumped on the slopes in 1978. Many shorter slopes have been reduced in angle to a more mild grade on Dumps L and parts of I (on the top of the dump). Benching has been used to control erosion on the slopes of Dumps I, Y_2 and L.

Slopes on Dumps L and K did not require surfacing due to the desirable soil on the slopes. The slopes of Dump I are being topdressed with 18 to 24 inches of favorable soil in order to improve conditions for revegetation.

Seeding (1978)

Eight native grass and shrub species compose the 1978-1979 seed mixture for reclamation sites at the Jackpile mine. This mixture will be drilled into reclamation sites at a rate of eight pounds per acre (Fig. 1).

Dumps O, P, P_1 and P_2 were reseeded in 1978. The dumps were reseeded with Blue Grama, Alkali Sacaton, Indian Ricegrass and Crested Wheatgrass.

Slope Stabilization Research Projects (1978)

The 1978 Seedling Transplant Project involved the use of Fourwing Saltbush (Atriplex Canescens) seedlings raised under greehouse conditions and transplanted onto Dump J slopes. Dump J's crust is composed of Tres Hermanos sandstone and displays no inhibitory problems. The program involves three phases: Phase I--shrub germination and growth; Phase II--planting of shrub seedlings; and, Phase III--monitoring of project progress and success.

Greenhouse seedlings were planted beginning in June, 1978. Approximately 500 seedlings were planted on the west face of Dump J and approximately 370 plants on the east slope. A total of 0.8 acres were transplanted. Following problem observation, modifications of the procedures were made to improve plant survival. The surviving seedlings will establish themselves as seed sources for the slope.

Slope revegetation of mine overburden dumps, using a power mulcher to propel native grasses and shrub seed onto slope surfaces, was attempted on a large scale during the 1978 summer planting season. The seed was mixed with barley straw (the transport media) and blown over the crest of the dump onto the slope. The seed and mulch was then worked into the slope surface. The success of this slope project will be monitored, documented and reported in subsequent annual reports.

DUMPS	ACRES OF SLOPE PLANTED (1978)
J	3.7
C	1.4
D	1.0
E	1.0
F	1.5
G	2.5

Success Rates on 1978 Reclamation Projects

Success rates of the Seedling Transplant Project were evaluated in October, 1978. The survey revealed that the seedlings planted on the windward slope (west side) had better survival rates than those of the lee slope (east side). Of the seedlings planted on the west slope, 24.9% survived. On the east slope, 370 shrubs were planted and 9.8% survived. Considering that the seedlings did not receive 14% moisture by weight in the soil, which is needed for optimum growth, the success rate was adequate for slope conditions.

Dumps O, P, P_1 and P_2 were reseeded following an inspection which determined that the grasses planted last year were not germinating as expected due to poor rainfall. Refer to the 1978 Seeding section for grass species.

Success Rates on Reclamation Work Prior to 1978

Foliage cover and density data collected on Dump S in October of 1977 revealed a total cover of 6.8% and a relative foliage cover for all planted species of 78.3%. Dump S, 15 months after seeding, had 57% of the foliage cover found in the surrounding rangeland.* Dumps C, D, E, F and G are also scheduled for reseeding in June of 1979, pending a final success survey in the spring. Fourwing Saltbush has been very successful on Dumps E, F and G, but limited stands of favorable grasses exist on the dump surfaces. All reclaimed dumps to date will be surveyed for success rates and density values in the summer or fall of 1979.

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* Kelly, E., Reynolds, J., and Potter, L., 1977 Revegetation of Overburden, Anaconda's Open Pit Uranium Mine.

FUTURE RECLAMATION SCHEDULE AND PRACTICES

1979 - 1985

SCHEDULE*	LAND SURFACE FEATURE	ACTION	APPROX. ACRES
1979	Waste Dumps T, V, L, K, I, Y_2, a portion of X	Rip surface, seed, mulch and fertilize.	170
1979	C, D, E, F, G	Reseed, mulch and fertilize.	164
1979-1981	Waste Dumps H, U, A, B, W, N, Y	Topdress with materials from on-going stripping operations or top soil stockpiles. Prepare surface, lime if necessary, seed, mulch and fertilize.	240
1976-1981	Open Pits	Topdress and grade 100 acres of north Paguate Pit to flood plain level. Topdress remaining pit with materials from ongoing stripping operations, or top soil stockpiles. Lime if necessary, mulch, seed and fertilize.	100
1982-1985	Waste Dumps R, Q, North and South Dumps and Open Pits	Topdress pit areas with material from final stripping operations or top soil stockpiles. Lime if necessary, seed, mulch and ferti lize.	1,570
1982-1985	Areas supporting ore stockpiles, other storage areas	Rip surface, seed, mulch and fertilize. Topdress if necessary.	200
After 1985	Roads	Prepare surface, seed, mulch and fertilize.	130
After 1985	Open Pits	Topdress pit areas with material from final stripping operations or top soil stockpiles. Lime if necessary, seed, mulch and fertilize. Fence high walls around open pits.	570

* Provided that acreages are not completed on schedule, reclamation funds will be accrued for completion of designated work at a subsequent date.

RECLAMATION WORK COMPLETED IN 1978

YEAR RECLAIMED	SITE	ACREAGE	TYPE OF COVER	AMOUNT OF COVER	TECHNIQUE	WORK TO BE COMPLETED
1978	Dump K	13	Tres Hermanos sandstone	Existing material on dump	Graded surface. Construct erosion control system consisting of soil berms. Accumulate large rocks into piles.	To be seeded, mulched and fertilized in the summer of 1979
1978	Dump L	40	Tres Hermanos sandstone and some shales	Existing material on dump.	Graded surface and constructed erosion control system consisting of soil berms. Reduced many slope angles.	To be seeded, mulched and fertilized in the summer of 1979
1978	Dumps X, I & Y_2 (portion)	70	Tres Hermanos sandstone and some shales	Topdress, a cover depth of 18" to 24", is completed on the dump top surface. Cover material for the slopes has been hauled in and will be deposited after the first of the year.	Favorable soil material transported onto site to cover top surface and slopes. Grade surface, construct erosion control system consisting of soil berms, terraced slopes.	To be seeded, mulched and fertilized in the summer of 1979
1978	Dumps O, P, P_1 & P_2	31	Tres Hermanos sandstone	Existing material on dump.	Reseeded. Refer to 1978 seeding dump preparation completed in 1977	Completed. No other action needed at present.
1978	Dump J	0.8 (Slopes)	Tres Hermanos sandstone	Topdress 18" to 24" deep on top and slopes.	Transplanted Fourwing Saltbush seedlings on slopes. Refer to 1978 research projects.	Research project. Monitoring will continue to determine project success.
1978	Dumps J, C, D, E, F, & G.	11.1 (slopes)	Tres Hermanos sandstone	Existing material on C, D, E, Dump slopes. Topdress 18" to 24" on J, F, G, Dump slopes.	Propelled seed onto slope surface and worked seed into soil. Areas also mulched. Refer to 1978 research projects.	Research project. Monitoring will continue to determine project success.

NOTE:
1. Total approximate acreage--166.
2. Refer to the Surface Activity 1978 Map, Sheet 2, for site locations.
3. Investigations of Tres Hermanos sandstone reveal that it possesses the most favorable characheristics for plant establishment at the Jackpile Mine. The Tres Hermanos formation comprises the uppermost layer of the stratigraphis column and is aesthetically acceptable due to its brown color (Fig. 2).

RECLAMATION SITES COMPLETED 1976 AND 1977

YEAR RECLAIMED	SITE	ACREAGE	TYPE OF COVER	AMOUNT OF COVER	TECHNIQUE	WORK TO BE COMPLETED
1977	Dumps O,P,P_1 and P_2	31	Tres Hermanos sandstone	Existing material on dumps	Graded and ripped top surface; constructed erosion control system consisting of soil berms, seeded, mulched and fertilized (Fig. 3).	Reseeded summer of 1978
1977	Dump C	17	Tres Hermanos sandstone	Existing material on dump	Same as for Dumps O, P, P_1 and P_2.	To possibly be reseeded summer of 1979
1977	Dump D	15	Tres Hermanos sandstone	Existing material on dump	Same as for Dumps O, P, P_1 and P_2.	Same as for Dump C
1977	Dump E	11	Tres Hermanos sandstone	Existing material on dump, portions cover with 18" to 24".	Same as for Dumps O, P, P_1 and P_2.	Same as for Dump C
1977	Dump F	83	Mixture of Tres Hermanos sandstone and some shale	Topdress 18" to 24" deep on top and slopes.	Favorable soil material transported onto site to cover top surface and slopes. Grade and rip top surface, construct erosion control system consisting of soil berms. Seed, mulch and fertilize (Fig. 3).	Same as for Dump C
1977	Dump G	38	Mixture of Tres Hermanos sandstone and some shale	Topdress 18" to 24" deep on top and slopes.	Same as for Dump F	Same as for Dump C
1977	Dump J	13	Tres Hermanos sandstone	Topdress 18" to 24" deep on top and slopes.	Same as for Dump F	Complete. No other action needed at present.
1977	Dump T	26	Tres Hermanos sandstone	Topdress 18" to 24" deep on top and slopes.	Same as for Dump F.	To be seeded, mulched and fertilized summer of 1979
1977	Dump V (portion)	21	Tres Hermanos sandstone	Topdress 18" to 24" deep on top and slopes.	Same as for Dump F.	Same as for Dump T.
1976	Dump S	72	Tres Hermanos sandstone	Existing material on dump.	Crushed existing rock on surface to prepare seedbed 18" to 24" deep; graded top surface. Seeded, mulched & fertilized (Fig. 4).	Complete. Good success rates. No other action needed at present.

NOTE: Refer to the Surface Activity 1978 Map, Sheet 2, for site locations.

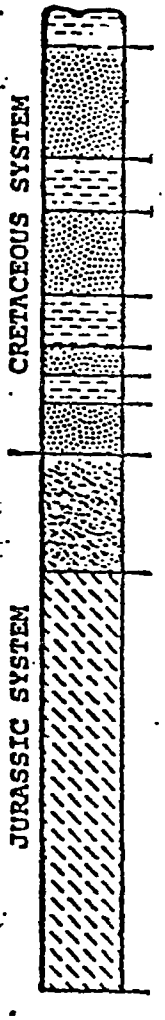
Figure 1.

SEED MIXTURES FOR 1978 AND 1979

Genus & Species	Common Name	% of Mixture
Bouteloua gracilis	Blue Grama (Lovington)	30
Bouteloua curtipendulia	Sideoats Grama (Vaughn)	10
Oryzopsis hymenoides	Indian Ricegrass (Paloma)	10
Agropyron smithii	Western Wheatgrass	10
Atriplex canescens	Four-wing Saltbush	5
Sporoboius airoides	Alkali Sacaton	15
Eragratis curvula	Weeping Lovegrass	15
Melilotus officinales	Yellow Sweetclover	5
TOTAL		100%

Figure 2.

TYPICAL STRATIGRAPHIC COLUMN



FORMATION	UNIT	THICKNESS (feet)
MANCOS	TRES HERMANOS	180-450
DAKOTA		
MANCOS		
DAKOTA		
MANCOS		
DAKOTA		
MANCOS		
DAKOTA BED		50
	JACKPILE BED	0-220
	BRUSHY BASIN	250-350
	WESTWATER CANYON	0-50
	RECAPTURE	50-100
MORRISON		

SOURCE: KITTEL, 1963

Figure 3.

SEED MIXTURES FOR 1977

Genus & Species	Common Name	% of Mixture
Bouteloua gracilis	Blue Grama (Lovington)	25
Oryzopsis hymenoides	Indian Ricegrass (Paloma)	10
Atriplex Canescens	Four-wing Saltbush	5
Agropyron Disertar	Crested Wheatgrass (Nordan)	15
Sporobolus Airoides	Alkali Sacaton	15
Eragratis Curvula	Weeping Lovegrass	15
Sporobolus Crytandrus	Sand Dropseed	10
	White Clover	5
	Fall Barley	No Mixture Broadcast
	Four-wing (slopes)	No Mixture Broadcast
TOTAL		100%

Figure 4.

SEED MIXTURES FOR 1976
(Applied on Pilot Project)

Genus & Species	Common Name	% of Mixture
Boutelous Gracilis	Blue Grama (*Lovington*)	30
Sporobolus Cryptandrus	Sand Dropseed	15
Boutelous Curtipendula	Sidecats Grama (Vaughn)	4
Sporobolus Airoides	Alkali Sacaton	5
Oryzopsis Hymenoides	Indian Ricegrass (Paloma)	5
Eragrostis Curvula	Weeping Lovegrass	10
Andropogon Scoparius	Little Bluestem (Pastura)	15
Agropyron Smithii	Western Wheatgrass	5
Andropogon Hallii	Sand Bluestem	6
Melilotus Officinales	Sweetclover	5
Atriplex Canescens	Four-wing Saltbush	Broadcast
TOTAL		100%